

Scan Parameters Profile (SCPP)

Bluetooth® Test Suite

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1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and test cases to test the implementation of the Bluetooth Scan Parameters Profile Specification with the objective to provide a high probability of air interface interoperability between the tested implementation and other manufacturers' Bluetooth devices.

2 References, definitions, and abbreviations

2.1 References

This document incorporates provisions from other publications by dated or undated reference. These references are cited at the appropriate places in the text, and the publications are listed hereinafter.

- [1] Test Strategy and Terminology Overview
- [2] Bluetooth Core Specification, Version 4.0 or later
- [3] Scan Parameters Service Specification, Version 1.0
- [4] GATT Test Suite, GATT.TS.4.0.1
- [5] GAP Test Suite, GAP.TS
- [6] Scan Parameters Profile Specification, Version 1.0
- [7] ICS Proforma Scan Parameters Profile, SCPP.ICS

2.2 Definitions

In this Bluetooth document, the definitions from [1] and [2] apply.

2.3 Acronyms and abbreviations

In this Bluetooth document, the definitions, acronyms, and abbreviations from [1] and [2] apply.

3 Test Suite Structure (TSS)

3.1 Overview

The Scan Parameters Profile is a client of GAP, SM, and GATT. This is illustrated in [Figure 3.1](#).

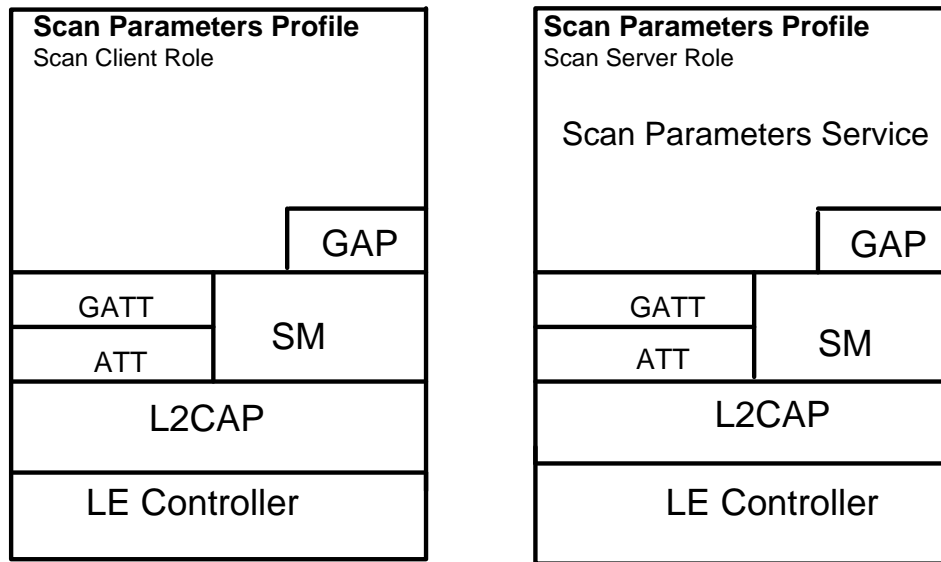


Figure 3.1: Scan Parameters Profile Test Model

3.2 Test Strategy

The test objectives are to verify functionality of the Scan Parameters Profile within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach covers mandatory and optional requirements in the specification and matches these to the support of the IUT as described in the ICS. Any defined test herein is applicable to the IUT if the ICS logical expression defined in the Test Case Mapping Table (TCMT) evaluates to true.

The test equipment provides an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in this Test Suite. A Lower Tester acts as the IUT's peer device and interacts with the IUT over-the-air interface. The configuration, including the IUT, needs to implement similar capabilities to communicate with the test equipment. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, a Man Machine Interface (MMI), or another interface supported by the IUT.

This Test Suite contains Valid Behavior (BV) tests complemented with Invalid Behavior (BI) tests where required. The test coverage mirrored in the Test Suite Structure is the result of a process that started with catalogued specification requirements that were logically grouped and assessed for testability enabling coverage in defined test purposes.

3.2.1 Scan Parameters Profile Scan Client Testing Configuration

The following configuration is recommended for testing Scan Parameters Profile Scan Client IUT:

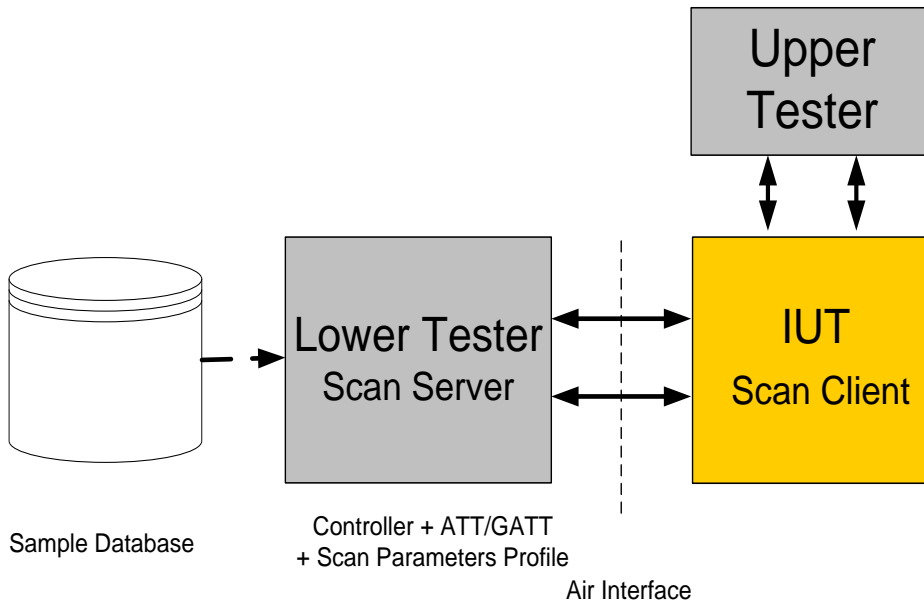


Figure 3.2: Scan Parameters Profile Scan Client Testing Configuration

The sample database of Characteristics used by the Lower Tester is specified in each test case.

All Scan Parameters Profile Scan Client test cases, which use a configuration as shown in [Figure 3.2](#), contain test procedure descriptions and expected results. These in turn use example message syntax between the Upper Tester and the IUT. Those example messages are generic; there is no normative specification for these messages. The normative specifications are the functional descriptions for the test procedures and the expected results.

In Test Cases where more than one alternative method of performing the Test Case exists, a Scan Client IUT performs the Test Case once for each supported alternative method.

3.3 Test groups

The following test groups have been defined:

- Generic GATT Integrated Tests
- Configuration Features
- Notification Features

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

Test cases are assigned unique identifiers per the conventions in [1]. The convention used here is:

<spec abbreviation>/<IUT role>/<class>/<feat>/<func>/<subfunc>/<cap>/<xx>-<nn>-<y>.

Additionally, testing of this specification includes tests from the GATT Test Suite [4] referred to as Generic GATT Integrated Tests (GGIT); when used, the GGIT tests are referred to through a TCID string using the following convention:

<spec abbreviation>/<IUT role>/<GGIT test group>/< GGIT class >/<xx>-<nn>-<y>.

Identifier Abbreviation	Spec Identifier <spec abbreviation>
SCPP	Scan Parameters Profile
Identifier Abbreviation	Role Identifier <IUT role>
CL	Scan Parameters Profile Client Role
Identifier Abbreviation	Reference Identifier <GGIT test group>
CGGIT	Client Generic GATT Integrated Tests
Identifier Abbreviation	Reference Identifier <GGIT class>
CHA	Characteristic
SER	Service
Identifier Abbreviation	Feature Identifier <feat>
SPCF	Scan Parameters Profile Configuration Features
SPNF	Scan Parameters Profile Notification Features

Table 4.1: SCPP TC feature naming conventions

4.1.2 Conformance

When conformance is claimed for a particular specification, all capabilities are to be supported in the specified manner. The mandated tests from this Test Suite depend on the capabilities to which conformance is claimed.

The Bluetooth Qualification Program may employ tests to verify implementation robustness. The level of implementation robustness that is verified varies from one specification to another and may be revised for cause based on interoperability issues found in the market.

Such tests may verify:

- That claimed capabilities may be used in any order and any number of repetitions not excluded by the specification
- That capabilities enabled by the implementations are sustained over durations expected by the use case
- That the implementation gracefully handles any quantity of data expected by the use case
- That in cases where more than one valid interpretation of the specification exists, the implementation complies with at least one interpretation and gracefully handles other interpretations
- That the implementation is immune to attempted security exploits

A single execution of each of the required tests is required to constitute a Pass verdict. However, it is noted that to provide a foundation for interoperability, it is necessary that a qualified implementation consistently and repeatedly pass any of the applicable tests.

In any case, where a member finds an issue with the test plan generated by Launch Studio, with the test case as described in the Test Suite, or with the test system utilized, the member is required to notify the responsible party via an erratum request such that the issue may be addressed.

4.1.3 Pass/Fail verdict conventions

Each test case has an Expected Outcome section. The IUT is granted the Pass verdict when all the detailed pass criteria conditions within the Expected Outcome section are met.

The convention in this Test Suite is that, unless there is a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon as one of the pass criteria conditions cannot be met. If this occurs, then the outcome of the test is a Fail verdict.

4.2 Setup preambles

The procedures defined in this section are used to achieve specific conditions on the IUT and the test equipment within the tests defined in this document. The preambles here are commonly used to establish initial conditions.

4.2.1 ATT Bearer on LE Transport

Follow the preamble procedure described in [4] Section 4.2.1.2.

4.3 Generic GATT Integrated Tests

Execute the Generic GATT Integrated Tests defined in Section 6.4, Client test procedures (CGGIT), in [4] using Table 4.2 below as input:

TCID	Service / Characteristic	Reference	Properties	Value Length (Octets)	Service Type
SCPP/CL/CGGIT/SER/BV-01-C [Service GGIT – Scan Parameters]	Scan Parameters Service	[6] 4.2.1	-	-	Primary Service, Unique
SCPP/CL/CGGIT/CHA/BV-01-C [Characteristic GGIT – Scan Interval Window]	Scan Interval Window Characteristic	[6] 4.3.1.1, 4.4	0x04 (Write Without Response)	4	-
SCPP/CL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Scan Refresh]	Scan Refresh Characteristic	[6] 4.3.1.2, 4.5	0x10 (Notify)	Skip	-

Table 4.2: Input for the GGIT Client test procedure



4.4 Configuration Features

The procedures defined in this Test Group verify implementation of the Scan Parameter Profile Configuration Features by a Scan Client IUT.

SCPP/CL/SPCF/BV-01-I [Scan Refresh Client Characteristic Configuration - Enable Notifications (Write with 0x0001)]

- Test Purpose

Verify that the Client Characteristic Configuration Descriptor for the Scan Refresh characteristic can be configured for notification by a Scan Client IUT.
- Reference

[6] 4.3.1.2
- Initial Condition
 - Establish an ATT Bearer connection between the Lower Tester and the IUT as defined in Section 4.2.1. The Scan Client (IUT) and the Scan Server (Lower Tester) may have bonded following GAP procedures.
 - The Lower Tester has a single instance of the Scan Parameters Service [3]. That instance contains one and only instance of the Scan Refresh characteristic, and one and only one instance of the Client Characteristic Configuration Descriptor for the Scan Refresh characteristic.
 - The IUT has executed SCPP/CL/CGGIT/CHA/BV-02-C [Characteristic GGIT – Scan Refresh] and has saved the handle for the instance of the Client Characteristic Configuration Descriptor for the Scan Refresh characteristic.
- Test Procedure

The Upper Tester commands the IUT to enable notifications for the Scan Refresh characteristic.

The IUT sends an ATT_Write_Request with the value 0x0001 to the Lower Tester with the handle specified in initial conditions.

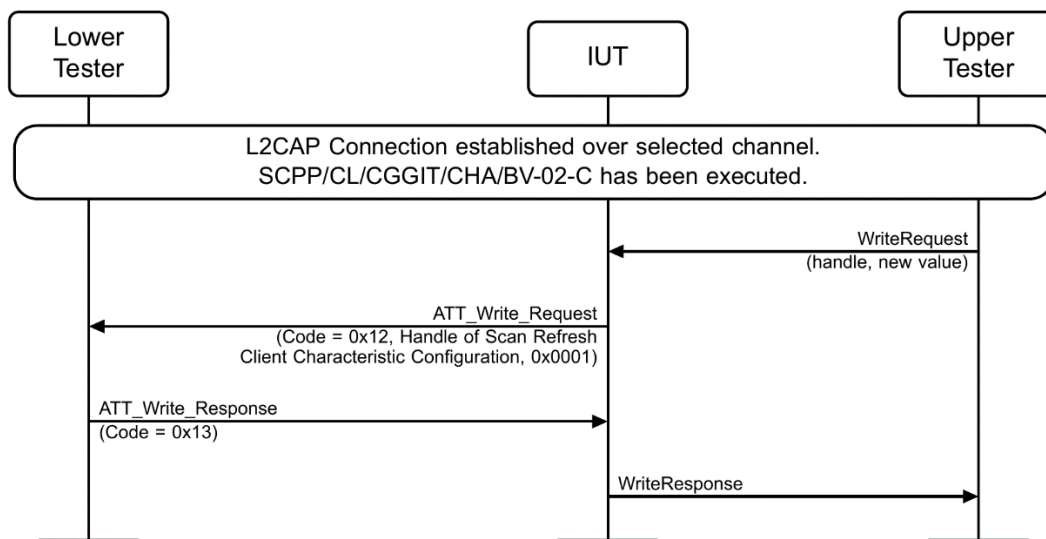


Figure 4.1: Scan Refresh Client Characteristic Configuration - Enable Notifications (Write with 0x0001)

- Expected Outcome

Pass verdict

The IUT sends a correctly formatted ATT_Write_Request to the Lower Tester using the handle specified by the upper tester and the value 0x0001.

The IUT receives a correctly formatted ATT_Write_Response from the Lower Tester and sends the WriteResponse to the Upper Tester.

4.5 Notification Features

The procedures defined in this Test Group verify implementation of the Scan Parameter Profile Notification Features by a Scan Client IUT.

SCPP/CL/SPNF/BV-01-I [Scan Refresh Characteristic - Scan Behavior update Upon Receiving Notifications]

- Test Purpose

Verify that, when the Client Characteristic Configuration characteristic descriptor is configured for notification, a Scan Client IUT can successfully receive notifications for the Scan Refresh characteristic, and perform a write to the Scan Interval Window characteristic upon receiving that notification.

- Reference

[6] 4.5

- Initial Condition

- Establish an ATT Bearer connection between the Lower Tester and the IUT as defined in Section 4.2.1.
- The Lower Tester and the IUT have bonded following GAP procedures.
- The Lower Tester has a single instance of the Scan Parameters Service [3].
- The IUT has executed SCPP/CL/CGGIT/CHA/BV-01-C [Characteristic GGIT – Scan Interval Window] and has saved the handle for the instance of the Scan Interval Window characteristic.
- The IUT has executed SCPP/CL/SPCF/BV-01-I [Scan Refresh Client Characteristic Configuration - Enable Notifications (Write with 0x0001)] and has configured the Client Characteristic Configuration Descriptor for the Scan Refresh characteristic for notifications.

- Test Procedure

The Lower Tester sends an ATT_Handle_Value_Notification containing the Scan Refresh characteristic value to the IUT.

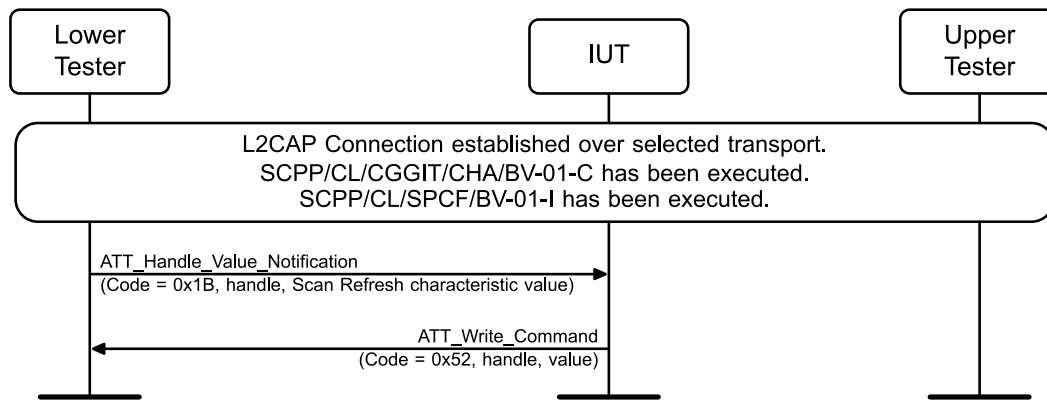


Figure 4.2: Scan Refresh Characteristic - Scan Behavior update Upon Receiving Notifications

- Expected Outcome

Pass verdict

The IUT sends a correctly formatted ATT_Write_Command to the Lower Tester, specifying the handle of the Scan Interval Window characteristic and the value for LE_Scan_Interval and LE_Scan_Window that is to be written.

5 Test case mapping

The Test Case Mapping Table (TCMT) maps test cases to specific requirements in the ICS. The IUT is tested in all roles for which support is declared in the ICS document.

The columns for the TCMT are defined as follows:

Item: Contains a logical expression based on specific entries from the associated ICS document. Contains a logical expression (using the operators AND, OR, NOT as needed) based on specific entries from the applicable ICS document(s). The entries are in the form of y/x references, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS document for the Scan Parameters Profile (SCPP) [7].

Feature: A brief, informal description of the feature being tested.

Test Case(s): The applicable test case identifiers are required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported.

For the purpose and structure of the ICS/IXIT, refer to [1].

Item	Feature	Test Case(s)
SCPP 7/1	Discover Scan Parameters Service	SCPP/CL/CGGIT/SER/BV-01-C
SCPP 7/2	Scan Interval Window Characteristic for Scan Parameters Service	SCPP/CL/CGGIT/CHA/BV-01-C
SCPP 7/3	Scan Refresh Characteristic for Scan Parameters Service	SCPP/CL/CGGIT/CHA/BV-02-C
SCPP 8/2	Configure Client Characteristic Configuration for Scan Refresh Characteristic	SCPP/CL/SPCF/BV-01-I
SCPP 8/3	Scan Refresh Notification Behavior	SCPP/CL/SPNF/BV-01-I

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2011-12-27	Adopted by the Bluetooth SIG Board of Directors
	1.0.1r1	2012-09-05	TSE 4854: Changes to TCMT, removed GATT references and left only the SCPP references. TSE 4930: Change test case IDs from –C to –I.
1	1.0.1	2012-10-30	Prepare for Publication
	1.0.2r00	2016-05-26	Converted to new Test Case ID conventions as defined in TSTO v4.1.
	1.0.2r01	2016-06-03	Converted to current Test Spec template.
2	1.0.2	2016-07-14	Prepared for TCRL 2016-1 publication.
	1.0.2 edition 2r00	2018-11-29	Editorial changes only. Template updated. Revision History and contributors moved to the end of the document.
	1.0.2 edition 2	2020-01-10	Updated copyright page and confidentiality markings to support new Documentation Marking Requirements, performed minor formatting updates, and accepted all tracked changes to prepare for edition 2 publication.
	p3r00–r02	2023-05-10 – 2023-05-25	<p>TSE 22809 (rating 2): Converted the following 5 test cases to GGIT: SCPP/CL/SPDS/BV-01-I, SCPP/CL/SPDC/BV-01-I – -03-I, and SCPP/CL/SWCF/BV-01-C. The 3 new GGIT converted TCIDs are SCPP/CL/CGGIT/SER/BV-01-C and SCPP/CL/CGGIT/CHA/BV-01-C and -02-C. Updated the TCMT accordingly. Updated the initial condition and replaced the MSC in SCPP/CL/SPCF/BV-01-I and SCPP/CL/SPNF/BV-01-I. Updated the test groups section and the test case identification conventions.</p> <p>Performed other editorials to align the document with the latest TS template, including the addition of missing figure captions and updates to the scope, references, Test Strategy, test case identification conventions, conformance, Pass/Fail verdict conventions, and TCMT introductory text. Replaced the Bluetooth logo in the footer and updated the copyright page to align with v2 of the DNMD. Added a Publication Number column to the Revision History. Revised the document numbering convention, setting the last release publication of 1.0.2 as p2. Changed section titles for single test cases to Heading 8 style per the TS template. Deleted draft revision history comments prior to p0.</p>
3	p3	2023-06-29	Approved by BTI on 2023-05-28. Prepared for TCRL 2023-1 publication.

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